

Case Report

Necrotising soft tissue infection secondary to an incarcerated De Garengeot hernia

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ABSTRACT

De Garengeot hernias are rare and can be difficult to diagnose pre-operatively. This case presented as a right groin abscess with necrotising soft tissue infection extending into the right thigh. At operation, a perforated appendix was found within the femoral canal with a distal loop of small bowel fistulating into the abscess cavity. On review of the literature, this is the first case to be reported describing this finding.

Keywords: De Garengeot hernia, Appendicitis, Necrotising soft tissue infection, Femoral hernia

INTRODUCTION

The appendix herniating into the femoral canal is known as a De Garengeot hernia and accounts for only 0.15 to 5% of all femoral hernias.¹ In this case, a right groin abscess was the initial diagnosis in the emergency department. Following surgical review, the patient was investigated to exclude an incarcerated groin hernia. The final diagnosis at operation was an incarcerated De Garengeot hernia with associated necrotising soft tissue infection of the right thigh. This is a rare, life-threatening condition which requires urgent surgical management and can prove difficult to diagnose.

CASE REPORT

A 66-year-old male presented to the emergency department with a 10-day history of a painful right groin lump. He had noted a painless lump in the right groin for several years and had presumed it was due to recurrence of a previously repaired right inguinal hernia. The patient was acutely unwell and only able to provide a limited history. His co-morbidities included schizoaffective disorder, chronic obstructive pulmonary disease, gastro-oesophageal reflux disease, benign prostatic hypertrophy and peripheral vascular disease. His surgical history

included an open right inguinal hernia repair more than forty years ago. His medications included antihypertensives and inhalers. On examination, he was focally tender in the right lower quadrant. There was a 3-4 cm necrotic area in the right groin with approximately 15 cm area of surrounding cellulitis with subcutaneous emphysema (Figure 1).



Figure 1: Right groin and thigh demonstrating the area of necrosis with surrounding cellulitis.

Blood results revealed a leucocytosis of $37.5 \times 10^9/l$, a neutrophil count of $35.6 \times 10^9/l$ and a C-reactive protein of 208. A computed tomography (CT) abdomen pelvis was reported as an inguinal hernia containing incarcerated bowel with surrounding soft tissue oedema and gas which extended to the upper thigh (Figure 2).

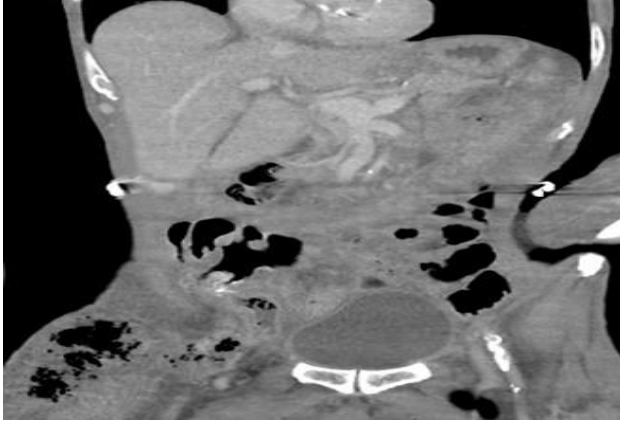


Figure 2: A coronal CT image of the femoral hernia and subcutaneous emphysema of the right thigh.

The patient was immediately taken to theatre due to concerns for necrotising soft tissue infection and bowel compromise. A laparoscopy was initially performed, at which the caecum, terminal ileum and a distal small bowel loop were found to be adhered to the right pelvic sidewall with associated acute on chronic inflammation (Figure 3). There were no associated intraabdominal fluid collections. Following this initial laparoscopic assessment, the right groin skin and subcutaneous tissue were debrided to healthy bleeding tissue up to the inguinal ligament.

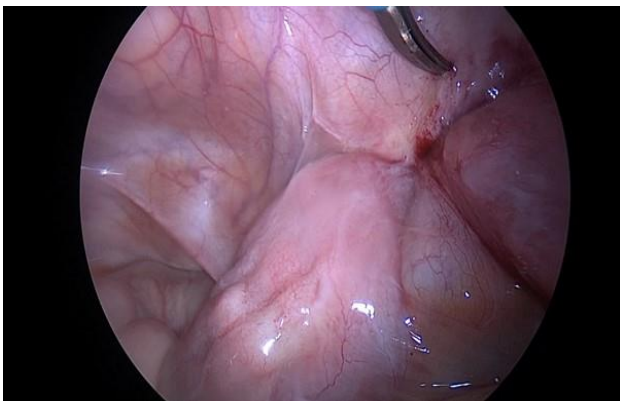


Figure 3: Laparoscopic image of caecum and terminal ileum adhered to the right pelvic side wall.

Laparoscopy was recommenced and on mobilisation of the caecum, an inflamed appendix with purulent exudate was freed from the femoral canal (Figure 4). A lower midline laparotomy was performed to further inspect the adherent distal small bowel loop. A large hole was identified at the base of the appendix and the neighbouring adhered loop of distal small bowel had also fistulated with the abscess

cavity. This small bowel loop was 80 cm from the ileocaecal valve and was included in an ileocolic resection. The abscess cavity within the femoral canal was washed out but not closed due to concerns for causing a vascular injury in the context of severe inflammation. Following mass closure, the right groin soft tissue was reassessed and further debrided back to healthy, bleeding tissue. The wound was packed with betadine-soaked gauze. Subsequent returns to theatre occurred at day 1, day 4, and day 11 post operatively for further tissue debridement and application of a vacuum-assisted closure device (VAC), with subsequent VAC changes on the ward.

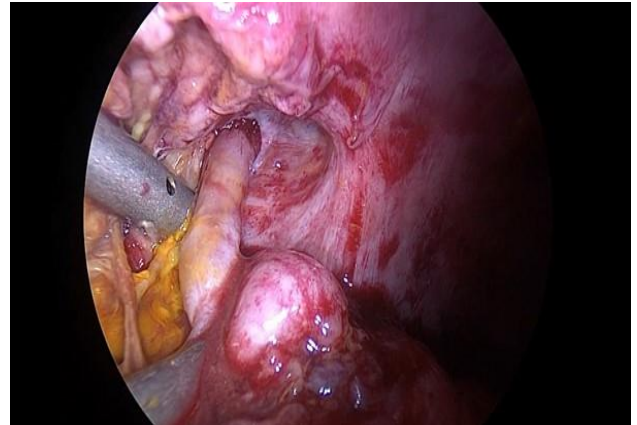


Figure 4: Laparoscopic image of appendix being freed from the femoral hernia.

Histology confirmed a necrotic appendix with perforation at the base which had fistulated into the adherent distal small bowel loop included in the specimen. The right groin soft tissue was reported as necrotic skin and subcutaneous tissue with abscess formation. The tissue culture grew *Escherichia coli* and *Streptococcus anginosus*. Blood cultures were also positive for *Escherichia coli*. The patient was treated with a prolonged course of piperacillin-tazobactam. On day 14 post operatively, with negative serial wound swabs, the patient returned to theatre for delayed closure with a perforator flap for tissue coverage of the area. He was discharged from hospital after 5 weeks and had no complications when reviewed in clinic 6 months post-operatively.

DISCUSSION

The De Garengeot hernia was named after the French surgeon Rene-Jacques Croissant De Garengeot who first described it in 1731.² In 1785, Hevin was the first surgeon reported to have performed an appendicectomy in such a case.³ De Garengeot hernias account for only approximately 0.15 to 5% of all femoral hernias. Guenther et al carried out a systematic review in 2020 identifying only 222 cases of De Garengeot hernias reported in English language literature since 1925. Only 31.5% of cases had a pre-operative diagnosis, highlighting the rarity of this diagnosis and the dependence on case reports to

gain knowledge on typical presentations and management of this condition.¹

Despite femoral hernias being less common than inguinal hernias, they account for 2-4% of all groin hernia repairs.⁴ When considering the anatomy of the femoral canal, it is understandable why a femoral hernia is more likely to require emergency surgery. It is bordered laterally by the femoral vein, anteriorly by the inguinal ligament, posteriorly by the pectineal ligament and superior ramus of the pubic bone, and medially by the lacunar ligament. The rigidity of its ligamentous and bony boundaries does not allow for expansion in response to herniated structures within the canal which increases the likelihood of incarceration and strangulation.^{4,5} With this in mind, some cases of De Garengeot hernias with appendicitis, may be caused by extraluminal compression from the femoral canal rather than the expected intraluminal obstruction by lymphoid proliferation or a faecolith.⁶ Multiple theories have been postulated regarding the aetiology of De Garengeot hernias, including whether a mobile or malrotated caecum potentiates migration of a pelvic positioned appendix into the femoral canal and also whether a long appendix is more likely enter a femoral hernia.¹ Priego et al suggested that if the appendix incidentally entered a femoral hernia sac, it would be subject to trauma that could lead to adhesion formation and cause the appendix to remain stuck in the hernia sac.⁷

With regards to femoral hernia repair in general, there are multiple open surgical techniques described. These can be categorised into anterior; femoral (low) and inguinal (high), and posterior; preperitoneal approaches. Laparoscopic femoral hernia repair has also become more popular over the last 2 decades.⁸ With regards to De Garengeot hernias, there is no recommended approach and a variety of approaches have been reported. Guenther et al suggest a laparoscopic approach could be considered if there is a pre-operative diagnosis of De Garengeot hernia and the patient is stable. Apart from minimising incisions, laparoscopy has the added benefit of providing an opportunity to evaluate the rest of the abdomen. Operating on incidental De Garengeot hernias without appendicitis is recommended in patients who are fit for surgery. An open approach can be employed if the appendiceal base can be managed through the incision. If there are concerns for intra-abdominal contamination, a laparotomy may be necessary.¹ A review carried out Kalles et al did not provide any specific recommendations for operative management and concluded that the surgical approach ultimately depends on the surgeon's judgement.⁹

In this case, a hybrid approach was used. An initial brief laparoscopic assessment was performed to exclude intra-abdominal contamination. Once this assessment was complete, the focus was to gain control of the soft tissue infection. Attention was then redirected to further assessment of the caecum and terminal ileum. The additional concern of the distal small bowel loop

fistulating into the abscess cavity prompted conversion to an open procedure.

On review of the literature, there has only been 5 cases of De Garengeot hernias presenting with necrotising soft tissue infection of the right groin and thigh reported.¹⁰⁻⁴ With most other cases of De Garengeot hernias presenting as a painful lump in the groin, some of which have associated erythema or simply discovered incidentally. To our knowledge, this is the first case of a De Garengeot hernia with perforated appendicitis and an associated small bowel fistula and necrotising soft tissue infection of the right groin and thigh. The associated necrotising soft tissue infection and small bowel fistula adds a greater level of complexity when considering how to treat this patient.

CONCLUSION

De Garengeot hernias are rare and have the potential to cause life threatening conditions such as necrotising soft tissue infection and intra-abdominal sepsis. They can be difficult to diagnose as they may simply present as a groin lump or abscess. A delay in diagnosis could result in catastrophic outcomes for the patient. There are no guidelines available to advise on how to manage this condition. Reporting individual cases such as this, serves as a reminder to consider unusual causes for a groin abscess that may have grave consequences if not identified at presentation.

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REFERENCES

1. Guenther TM, Theodorou CM, Grace NL, Rinderknecht TN, Wiedeman, JE. De Garengeot hernia: a systematic review. *Surg Endosc.* 2021;35(2):503-13.
2. Croissant De GRJ. *Traite des operations de chirurgie.* Volume 1. Forgotten Books; 2014.
3. Hévin P. *Cours de pathologie et de thérapeutique chirurgicales.* Paris: Méquignon; 1973.
4. Dahlstrand U, Wollert S, Nordin P, Sandblom G, Gunnarsson U. Emergency femoral hernia repair: A study based on a national register. *Ann Surg.* 2009;249(4):672-6.
5. Loriau J. Anatomy of the Femoral Region. In: Campanelli, G. *The art of hernia surgery: a step-by-step guide.* Springer. 2018;442.
6. Barbaros U, Asoglu O, Seven R, Kalayci M. Appendicitis in incarcerated femoral hernia. *Hernia J Hernias Abdominal Wall Surg.* 2004;8(3):281-2.
7. Priego P, Lobo E, Moreno I, Sánchez-Picot S, Gil Olarte MA, Alonso N, et al. Acute appendicitis in an incarcerated crural hernia: analysis of our experience. *Revista española de enfermedades digestivas.* 2005;97(10):707-15.

8. Mandala S, La Barbara C, Callari C, Mirabella A, Mandala V. Primary Femoral Hernia: Open Anterior Treatment. In: Campanelli, G. *The art of hernia surgery: a step-by-step guide*. Springer. 2018;445.
9. Kalles V, Mekras A, Mekras D, Papapanagiotou I, Al-Harethee W, Sotiropoulos G, et al. De Garengeot's hernia: a comprehensive review. *Hernia J Hernias Abdominal Wall Surg.* 2013;17(2):177-82.
10. Rose RH, Cosgrove JM. Perforated appendix in the incarcerated femoral hernia. A place for preperitoneal repair. *New York State J Med.* 1988;88(11):600-2.
11. Guirguis EM, Taylor GA, Chadwick CD. Femoral appendicitis: an unusual case. *Canadian journal of surgery. J Canadien de Chirurgie.* 1989;32(5):380-1.
12. Briceño E, Jara R. Fascitis necrotizante de la pared abdominal como presentación infrecuente de una hernia de Garengeot: Caso clínico. *Revista Médica de Chile.* 2018;146(5):660-4.
13. Liu D, Hoang C, Zhang T, Cui H. Necrotizing Soft Tissue Infection of the Right Upper Thigh Secondary to Perforated Appendicitis in a de Garengeot's Hernia-Report of a Case and Review of the Literature. *Ann Case Report.* 2021;6:597.
14. Voitk, AJ, Macfarlane JK, Estrada RL. Ruptured appendicitis in femoral hernias: report of two cases and review of the literature. *Ann Surg.* 1974;179(1):24-6.

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